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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,212	09/26/2006	Naruhisa Hirai	3273-0231PUS1	7227
2292 7590 05/27/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER LAO, MARIA LOUISA				
ART UNIT 1621		PAPER NUMBER		
NOTIFICATION DATE 05/27/2008		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/594,212

Applicant(s)

HIRAI ET AL.

Examiner

LOUISA LAO

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-7 and 9-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-7,9-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 3/18/08 have been fully considered, as follows:

a. the objection to claim 3 under 37 CFR 1.75(c) is withdrawn. However, new objection to claim 3 is made, see below

b. the rejection of claims 1-5, 7 and 9 under 35 U.S.C. 102(b) are persuasive, due to claim amendment. The rejection is withdrawn.

c. the rejection of claims 1-7 and 9 (and new claims 11-12) under 35 U.S.C. 103(a) are not persuasive. The rejection is maintained, see below.

c. the amendment of claim 1, incorporating the limitations of cancelled claim 2; the amendment of claim 9 and new renumbered claims 11-12 (see Claim Objections below) are acknowledged.

Claim Objections

2. Claim 3 is objected to because of the following informalities: in line 2, Applicants may have intended to not recite "or 2"; since claim 2 is a cancelled claim. Appropriate correction is required.

3. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 10-11 have been renumbered as claims 11 and 12. Appropriate correction is required.

Applicants are further respectfully requested to ascertain that the specification is free of typographical and grammatical errors.

Claim Rejections - 35 USC § 103

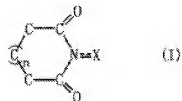
5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

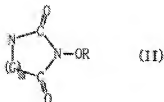
6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. The rejection of claims 1-7 and 9; and new claims 11-12 is maintained under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (EP1459804, EP'804) and Narihisa et al. (JP2003128618, JP'618) in view of Turner et al. (US6307099, US'099 *in IDS*).

8. The instant claims are drawn to a method for producing an aromatic carboxylic acid, by oxidizing an aromatic compound B with oxygen in the presence of a catalytic nitrogen-containing cyclic compound A. The catalysts have a skeleton represented by formula (i) and

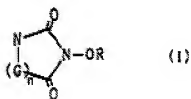


further, elucidated by Formula (I) and Formula (II), as shown



. The presence of a metallic compound promoter (like Co or Mn compounds), the quantity of catalyst (less than A), time of reaction of 0.5- 4 hours, temperature of 150°C and higher and a continuous feed and extraction using a plurality of reactors with B of 3.0%w or less at the most downstream reactor are recited.

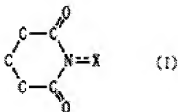
9. EP'804 teaches the processes of the production of organic compounds with catalysts comprising cyclic acylurea compounds with the formula (I) as shown:



. In page 39 Examples 20-21, EP'804 teaches the conversion of p-xylene into terephthalic acid, at catalyst levels of 3-5% by mole relative to p-xylene, in the presence of a cobalt (II) acetate and manganese (II) acetate at 100-150 deg for 12-14 hours. EP'804 teaches in page 9 [0050] that the amount of metallic compound is 0.0001 to 10 moles relative to 1 mole of the cyclic acylurea compound. EP'804 teaches in page 12 [0126] that the reaction can be batch, semi-batch, continuous or another conventional system; where the

addition of the cyclic acylurea compound catalyst to the reaction system in *installments*, effectuate to higher conversion or selectivity of the target compound. EP'804 teaches in page 12 [0127] that reaction products can be separated and purified by conventional techniques. EP'804 teaches in page 16 [0125] that the reaction temperature can be 20-200°C at reaction time of 10 minutes to 48 hours. EP'804 teaches that when oxygen-containing reactant is oxygen gas, it may be diluted with an inert gas (page 31 [0221]). EP'804 teaches in page 31 [0222] that the amount of oxygen can be varied depending on operability and can be 0.5 to 100 moles relative to non-Nitrogen containing compound/reactant. EP'804 typifies the reaction of an aromatic carboxylic acid in working examples, like Example 19 page 39 [0278], by the production of terephthalic acid at 100% conversion of p-xylene with its reaction with hexahydro-1,3,5-trihydroxy-1,3,5-triazine-2,4,6-trione, acetic acid, cobalt (II) acetate.4H₂O and manganese (II) acetate.4H₂O at 100°C in the presence of oxygen.

10. JP'618 teaches a method for producing aromatic carboxylic acids by oxidizing an aromatic compound having an aromatic ring linked with an alkyl group or its lower oxidized group with oxygen at 120 degC or more in the presence of a catalyst constituting an imide-based compound having a substituted N-cyclic imide skeleton shown by formula (I) below,



where X = an Oxygen atom or a hydroxyl group.

In [0057]-[0064], JP'618 typifies the conversion of acids from their corresponding aromatic hydrocarbons as illustrated by terephthalic acid from p-xylene reacting with oxygen in the

presence of the imide-based catalyst, the metal promoter cobaltous acetate and manganese acetate for 4 hours at 150degC. JP'618 in [0031] teaches that the amount of metallic compound is 0.0000001 to 0.1 mole relative to 1 mole of substrate.

11. The instant claims differ from EP'804 and JP'618 in the latter two's silence in the plurality of reactors used in the generation of the aromatic carboxylic acid or the level of the aromatic compound in most downstream reactor.

12. However, US'099 is relied upon to teach that a plurality of reactors or reactors in sequence in the production of terephthalic acid is known (column 1 lines 45-64).

13. Further, the differences of the instant claims from the cited prior art references are not patentable because at the time of Applicants' invention, one of ordinary skill in the art looking for a method of producing aromatic carboxylic acids from the reaction of the corresponding aromatic compound with oxygen in the presence of the acylurea or imide-containing catalyst with a Co/Mn metal compound promoters would have found it *prima facie* obvious to start with the teachings of the cited prior art references and couple said teachings with optimization steps, such as multiple reactors, as inferred from EP'804's teaching of *installment additions and the use of batch, semi-batch or continuous reactors*; or level of reactants and such as the level of aromatic compound, therein, to make Applicants' process using their methodology and parameters, thereto. The combination of the teachings of the cited prior art suggests that specific features of their invention may be combined with other features in accordance with the invention, and alternatively embodiments will be recognized by those skilled in the art and are intended to be included within the scope of the claims.

14. An artisan of ordinary skill in the art would have been motivated to modify the combined cited prior art processes, such as by optimization using multiple reactors or level of reactants therein, employing the concepts of conversion from batch (lab bench situations) to continuous reactions (suitable for manufacturing scenes), since these are within the purview of an artisan, with dictates of cost and availability of materials, through routine experimentation, to develop an optimized oxidation process with a reasonable expectation of producing aromatic carboxylic acids.

15. The recitation of multiple reactors or level of reactants therein, are optimization steps that are within the normal undertaking of one of ordinary skill in the art at the time of the invention and would not require any inordinate degree of experimentation. Optimizing such processes is *prima facie* obvious because an ordinary artisan would be motivated to use known processes from the art to make the process more efficient or explore economical advantages over the other. Merely modifying the process conditions is not a patentable modification absent a showing of criticality. In re Aller, 220 F.2d 454, 105 U.S.P.Q. 233 (C.C.P.A. 1955). In applying known technique to a known device (method, or product) ready for improvement to yield predictable results. The claim would have been obvious because a particular known technique, such as the use of multiple reactors, was recognized as part of the ordinary capabilities of one skilled in the art.

The claim would have been obvious because “a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product, not of innovation, but of ordinary skill and common sense.

- Applicants contend that the cited prior art references do not teach the limitation of “the molar ratio of the catalytic nitrogen-containing cyclic compound A to the aromatic compound B in the reaction system of 0.01 or more”;

However, the cited prior art references teach the “catalytic nitrogen-containing cyclic compound A to the aromatic compound B in the reaction system” and the molar ratio therewith would be routines of optimization, absent a showing of criticality and unexpected beneficial results, that one of ordinary skill in the art at the time of Applicants’ invention would engage in as part of experimentation. This limitation would be obvious because the artisan would be motivated to optimize his reaction to gain the benefits of less material use while defraying capital costs.

- Applicants contend that the cited prior art references do not teach the limitation of “an oxygen concentration in an offgas of 1% to 8% with the oxygen to be fed to the reaction system being an oxygen-containing gas containing oxygen in an amount of 10% to 50%”

However, the cited prior art reference, EP’804 may not have disclosed the exact % oxygen, however, EP’804 teaches in page 31 [0222] that the amount of oxygen can be varied depending on operability, which one of ordinary skill at the time of Applicants’ invention would engage in as part of experimentation. This limitation would be obvious, absent a showing of criticality and unexpected beneficial results, because the artisan would be motivated to optimize his reaction to gain the benefits of shortened reaction time, as alleged by Applicants, while defraying capital costs.

- Applicants allege that the secondary reference, US’099 teaches reactors suited for different “oxygen-containing” reactions.

However, Applicants may have misread that the secondary reference, US’099 is “relied upon to teach that a plurality of reactors or reactors in sequence in the production of terephthalic acid is known”.

- Applicants further allege that the secondary reference, US’099 does not teach the level of aromatic compound in the downstream reactor.

However, see *supra*, on what US’099 is relied upon to teach. As to the level of aromatic compound, absent a showing of criticality and unexpected beneficial results would be routines of optimization that one of ordinary skill in the art at the time of Applicants’ invention would engage in as part of experimentation. This limitation would be obvious because the artisan would be motivated to optimize his reaction to gain the benefits of defraying capital costs.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Louisa Lao whose telephone number is (571)272-9930. The examiner can normally be reached from 8:00am to 8:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyster can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Karl J. Puttlitz/
Primary Examiner, Art Unit 1621

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Louisa Lao
Examiner
TC1600 GAU 1621